

**International Lake Superior  
Board of Control  
Semi-Annual Progress Report to the  
International Joint Commission**  
Covering the Period September 14, 2000 to March 7, 2001

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Table 4: Monthly Distribution of Lake Superior Outflow (Customary Units)

**Front Cover:** Edison Sault Electric Co. Facilities -- Looking clockwise from the lower left:

a. View of Power Canal head gates looking east.

b. Looking north at the forebay and generator building.

c. View looking east towards Sugar Island of the Edison Sault Electric Co. Power Canal and the Soo Locks.

# International Lake Superior Board of Control



United States  
BG Robert H. Griffin, Member  
John W. Kangas, Secretary

Canada  
Doug Cuthbert, Member  
Peter P. Yee, Secretary

March 7, 2001

International Joint Commission  
Washington, D.C.  
Ottawa, Ontario

Commissioners:

This semi-annual report covers the Board's activities from September 14, 2000 to March 7, 2001.

## **1. Highlights**

Lake Superior levels remained well below their seasonal averages over the past six months, as they have since May 1998. Lake levels rose above chart datum in June then fell back below in October, remaining there since. Lake Superior levels have not been lower since 1925-26. Water supplies to Lake Superior were well below average during the first portion of the reporting period, near average in January, and February. On March 7, the lake was about 37 cm (15 in) below the average for that time of year, about 14 cm (6 in) lower than a year ago.

Water supplies to Lakes Michigan-Huron were also well below average during the first portion of the reporting period, but turned to above average in February. Their levels rose above chart datum in May, but fell below again in October where they currently remain, well below average. Lakes Michigan-Huron levels have not been lower since 1964-65. At the end of the reporting period, their levels were about 55 cm (22 in) below average, and about 11 cm (4 in) lower than a year ago.

Lake Superior outflows were as specified by Regulation Plan 1977-A during the reporting period and the Compensating Works gate setting was maintained at a setting equivalent to one-half gate open for the main rapids.

The Board's concern with under-reporting of flow through the U.S. Government and Edison Sault Electric Co. (ESEC) hydroelectric generating facilities continues. With the agreement of the Commission and the cooperation of the hydropower entities, interim steps were taken to resolve the problem. Effective December 2000, correction factors are being voluntarily applied to the current method of flow computations at the U.S. Government facility in order to have an accurate reporting of actual water use. The correction factor is based on power canal

flow measurements made in 1998, 1999 and 2000. With the Commission's agreement with the Board's proposal, correction factors are also being applied at the ESEC facility, effective January of this year. The ESEC correction factor is based on power canal flow measurements made in August 2000. Application of correction factors is an interim measure until the causes of the under-reporting are identified and corrected.

## **2. Monitoring of Hydrologic Conditions**

During the reporting period, the Board, through its staff, continuously monitored the water levels of Lakes Superior and Michigan-Huron, and the water levels and flows in the St. Marys River. The Regulation Representatives' monthly reports to the Board provided a hydrologic assessment, as well as recommendations on the regulation of outflows from Lake Superior. These reports also indicated the amount of water available for hydropower purposes, after the requirements for domestic use, navigation, and the fishery (St. Marys Rapids) were met.

Tables 1 and 2 list the recent monthly water levels, net basin supplies, and outflows for Lakes Superior and Michigan-Huron, respectively. Figure 1 compares the monthly water levels for this period to long-term averages and extremes. Figure 2 shows the monthly precipitation over the Lakes Superior and Michigan-Huron basins. Figure 3 shows the monthly net basin supply comparisons.

Precipitation over the Lake Superior basin was below average throughout the reporting period, except for February when it was above average. Dry conditions over the Lake Superior basin during the fall and winter resulted in below average water supplies for the period, except for February which was above average. A snow survey of the Lake Superior basin was made on February 26 - 28 to determine the water equivalent of the snowpack. This survey by the National Weather Service indicated that the snowpack on the basin is near or slightly above the normal snowpack for this time of the year.

Precipitation over the Lakes Michigan-Huron basin was slightly above average during the reporting period. Water supplies to these lakes were below average each month during the reporting period, except for February when the supply was above average.

Lake Superior levels have declined throughout the reporting period. They passed below chart datum of 183.2 m (601.1 ft) on October 10. Lake Superior's monthly average levels have ranged from 29 cm to 37 cm (about 11 to 15 in) below average during the reporting period. On March 7 Lake Superior was at elevation 182.91 m (600.10 ft), 37 cm (about 15 in) below average for that time of year and 14 cm (6 in) lower than one year ago. This is only 19 cm (7 in) above the record low level for March set in 1926.

Similarly, Lakes Michigan-Huron levels have declined throughout the reporting period. Levels fell below chart datum of 176.0 m (577.5 ft) on October 8 and have remained below chart datum for the balance of the reporting period. On March 7, Lakes Michigan-Huron were at elevation 175.79 m (576.74 ft), 55 cm (about 22 in) below average and 11 cm (about 4 in) lower than one year ago. This is only 22 cm (9 in) above the record low level for March set in 1964. Lakes Michigan-Huron levels ranged from 47 cm to 57 cm (about 18 to 22 in) below average during the reporting period.

### **3. Regulation of the Outflow from Lake Superior**

During the reporting period, the outflows of Lake Superior were as specified by Regulation Plan 1977-A. The gate setting at the Compensating Works supplying the main portion of the St. Marys Rapids was at an equivalent one-half of one gate open setting during the reporting period. Gate 1, which supplies water to the Fishery Remedial Works, remained set at 15 m<sup>3</sup>/s (530 cfs).

### **4. Governing Conditions During the Reporting Period**

The monthly mean levels of Lake Superior were within the limits of 182.76 and 183.86 meters (599.6 and 603.2 feet) specified in the Commission's Orders of Approval.

The daily mean water levels in the lower St. Marys River at the U.S. Slip Gage downstream of the U.S. Lock varied between elevation 175.85 m and 176.53 m (576.94 and 579.17 feet respectively). Thus the requirement for maintaining the river level at that location below 177.94 meters (583.8 feet) was satisfied.

### **5. Calibration, Repairs and Maintenance at the Compensating Works**

The U.S. Army Corps of Engineers (Corps) and Great Lakes Power Limited conducted the 5-year periodic inspection of the U.S. and Canadian portions of the Compensating Works during the period May 23 to 26, 2000. A draft inspection report has been prepared by the Detroit District and is under review. GLPL submitted its inspection report to the Board and IJC in September 2000. Except for leakage at the seals of the U.S. gates, the structure was generally found to be in excellent working condition. Funding has been made available for the Corps to study, analyze, make recommendations and prepare plans and specifications to remediate the leakage problem in 2001.

As part of the ongoing program to re-calibrate and upgrade the discharge ratings for the Compensating Works gates, flow measurements were conducted in August 2000. Additional measurements will be conducted in 2001.

### **6. Repairs and Maintenance at the Hydropower Facilities**

At the U.S. Government hydropower facility, Units 3 and 3A were taken off line for inspection during the periods December 4 - 7. The December flow allocation to ESEC was increased slightly to make up for the resulting reduced flow at the U.S. Government plant. It is anticipated that the U.S. hydropower plant will be fully automated by late 2001.

GLPL is upgrading its unit transformers. This should be completed in the spring. Because the current Lake Superior outflows are at the minimum, GLPL's discharge capacity is not affected.

Other than normal maintenance, no major repair work, except for the above, was carried out at either the U.S. Government, ESEC, or Great Lakes Power Limited hydropower plants during the reporting period.

In 1996 and 1997, the tainter gates adjacent to the U.S. plant were used for a total of 62 days to discharge water at times when capacity to pass water at the hydropower plants and the Compensating Works was insufficient. Subsequent inspections of the area immediately below the tainter gates showed a considerable amount of rock had been displaced and the bedrock was exposed and eroded in the area immediately beyond the gate apron. Due to concern about structural stability, no further discharges have been made pending a study of the situation. The Corps has analyzed and evaluated the affect of the rock displacement on the stability of the sluiceway piers. Initial conclusions are that further scour and erosion cannot be allowed. A report has been prepared and is currently under review internally. The Board will be kept informed and will report periodically on this to the Commission.

## **7. Water Usage in the St. Marys River**

Table 3 (Table 4 in U.S. Customary Units) lists the distribution of the outflows from Lake Superior for January 2000 through February 2001. Water uses are divided into four categories: domestic, navigation, fishery, and hydropower. According to the 1979 Supplementary Order, after the first three water requirements are satisfied, the remaining outflow from Lake Superior is shared equally between the U.S. and Canada for hydropower purposes. Any remaining flow allotment, beyond the discharge capacity of the hydropower plants, is normally discharged through the Compensating Works into the St. Marys Rapids.

As shown in the tables, the amount of water used for domestic purposes averaged about 4 m<sup>3</sup>/s (141 cfs).

The amount required for navigation lockage depended on traffic volume and varied from 2 to 17 m<sup>3</sup>/s (74 to 601 cfs respectively). The U.S. locks were closed on January 15, 2001 and are expected to open on March 25, 2001. The Canadian lock closed for the season October 15, 2000 and is expected to reopen in mid-May 2001.

In accordance with the Commission's Orders to fulfill the fishery needs in the Rapids, a minimum gate setting of one-half gate open, or its equivalent, is required at all times at the Compensating Works. In addition, a flow of at least 15 m<sup>3</sup>/s (530 cfs) in the Fishery Remedial Works (through Gate No. 1) must be maintained. A setting equivalent to one-half gate open was maintained in the Compensating Works during the reporting period. The flow in the St. Marys Rapids, including that through the Fishery Remedial Works, averaged about 95 m<sup>3</sup>/s (3,350 cfs) for the reporting period. Gate No. 1 remained set at 15 m<sup>3</sup>/s (530 cfs). This setting is expected to continue.

Flow measurements at the Compensating Works were made in August 2000 as part of the Board's continuing program to update the hydraulic rating of the structure. Measurements were conducted with gate open settings ranging from one-half gate (actual) to five gates open. A report to the Board on the results of these measurements is being prepared.

The results of power canal flow measurements conducted in 1998, 1999 and 2000 raised Board concerns about measured power canal flows being significantly greater than reported flows through the U.S. Government and ESEC hydropower plants. ESEC was so advised by the Board and requested to advise what corrective action would be taken. ESEC responded by stating their awareness of the situation and that several different problem areas had been identified. Analysis of flow computation software and study of a possible flow meter installation in the power canal are currently underway. Recalibration of the wicket gates at each turbine unit when in zero generation mode was completed during the summer 2000. August 2000 flow measurements indicated some improvement, but the under-reporting was still considered significant enough to warrant temporary corrective measures.

The Board provided an information report to the Commission on November 3, 2000. By letter of December 1, 2000, the Commission agreed that flow allocation adjustment begin no later than January 1, 2001. A December 12, 2000 letter from the Board informed ESEC that effective January 2001, a flow adjustment factor would be applied to their flow allocation. Each month the reported water usage will then be increased by the same adjustment factor to determine the actual water usage amount for the record. The flow adjustment factor is based on actual flow meter measurements conducted in the power canal in August 2000. This adjustment is considered an interim measure until the causes of the under-reporting are identified and corrected. ESEC is working with its hydropower consultants to remediate the problem.

The power canal flow measurements in 1998, 1999 and 2000 also showed that the U.S. Government hydropower plant is under-reporting its flows by about 9%. The U.S. Government plant has first priority in the U.S. flow allocation for hydropower and thus can flow up to its turbine capacity each month. Effective December 2000, the flow allocations to the U.S. Government plant, including Unit No. 10, are being adjusted upwards by 9% to reflect the actual water flow from the power canal into the plant. This adjustment is also considered a temporary measure until the causes of the under-reporting are identified and corrected. A Corps study team has been formed to determine the cause(s) of the under-reporting at this facility and to make recommendations for correction. Completion of the U.S. Government plant automation may help in reducing the under-reporting.

After implementation of corrective measures at the U. S. Government and ESEC hydropower plants, flow measurements will be conducted in the power canals to verify reported flows.

At the September 15, 1999 Board meeting, the Board's Canadian On-Site Representative informed the Board of a feasibility study by the Canadian Department of Heritage for installing and operating a small, low-head hydropower unit at the Canadian lock. The unit, using the lock chamber as a part of the conveyance system, would operate 24 hours per day during the non-navigation season, and about 12 hours per day during the navigation season. To date, there has been no further information presented on this project, however, it is still under consideration by Parks Canada.

## **8. Long Lac and Ogoki Diversions**

Ontario Power Generation continued to provide the Board with information on the operations of the Long Lac and Ogoki Diversions. The Ogoki Diversions into Lake Nipigon (which flows into Lake Superior) averaged 104 m<sup>3</sup>/s (3,670 cfs) from September 2000 through February 2001. The Long Lac Diversion averaged 23 m<sup>3</sup>/s (810 cfs) for the same period. Combined, these diversions were about 93 percent of average for the period.

## **9. Vidal Shoals Dredging**

During the reporting period, the Board was informed that the St. Marys River Dredging Project is scheduled to begin in the spring of 2001. This project consists of deepening and modifying widths in existing channels in the Upper St. Marys River between Pointe Louise Turn and the South Canal to the navigation locks, upstream of Sault Ste. Marie, Michigan and Ontario. The depths in specific areas will be increased by up to one foot and channel widths will be modified as necessary. Between 40,200 to 48,200 cubic meters (about 50,000 to 60,000 cubic yards) of material will be removed, with about 240 cubic meters (300 cubic yards) to be taken out of Canadian waters. Because of the potential effects on levels and flows of the boundary waters, the Corps conducted an analysis to assess the effects of this dredging on the water levels of Lake Superior. The results of this analysis indicated that the proposed dredging is expected to reduce stages at the upstream project limit by less than 0.003 foot. This will not have an impact on Board operations or the implementation of the regulation plan.

By letter dated 11 January 2001, the District informed the U.S. Department of State and the IJC of the negligible impacts of this project, and sought their approval to proceed with the project. By letter dated 5 March 2001, the U.S. Department of State gave the Corps of Engineers approval to proceed with the project. The Department of State received no adverse comments from the IJC or the Government of Canada and confirmed that no additional international coordination or approval is necessary before proceeding with the project.

## **10. Annual Meeting with the Public and Public Information**

The Board will hold its 2001 annual public meeting at the Inn at Christie's Mill in Port Severn, Ontario on Georgian Bay. The meeting is scheduled for June 27 from 7:00 PM to 9:00 PM.

The Board continues to issue, at the beginning of each month, news releases informing the public about Lake Superior regulation and water level conditions. In support of the Board and the Commission, the Detroit District of the Corps of Engineers maintains a Board home page on the world wide web. Content includes information on Board members and responsibilities as well as news releases, semi-annual reports and hydrologic data summaries.

The booklet "Living with the Lakes" continues to be distributed to all interested parties. About 47,000 copies have been distributed since its release in November 1999.



## **11. Plan of Study**

In January, the Board's staff was informed that funding was made available to the U.S. Section of the Commission to develop a detailed Plan of Study to examine the regulation criteria of the Orders of Approval. Board staff has been working with the Commission staff to identify potential participants in this effort and to develop a mutually agreeable approach to accomplish this work. It is anticipated that this effort will begin in late spring of this year.

## **12. Board Membership and Meetings**

Mr. Robert Sheldon of Parks Canada has been appointed as the Board's Canadian Section On-Site Representative.

The Board met in Niagara Falls, NY on March 7, 2001. Both Board Members and the Alternate U.S. Member attended.

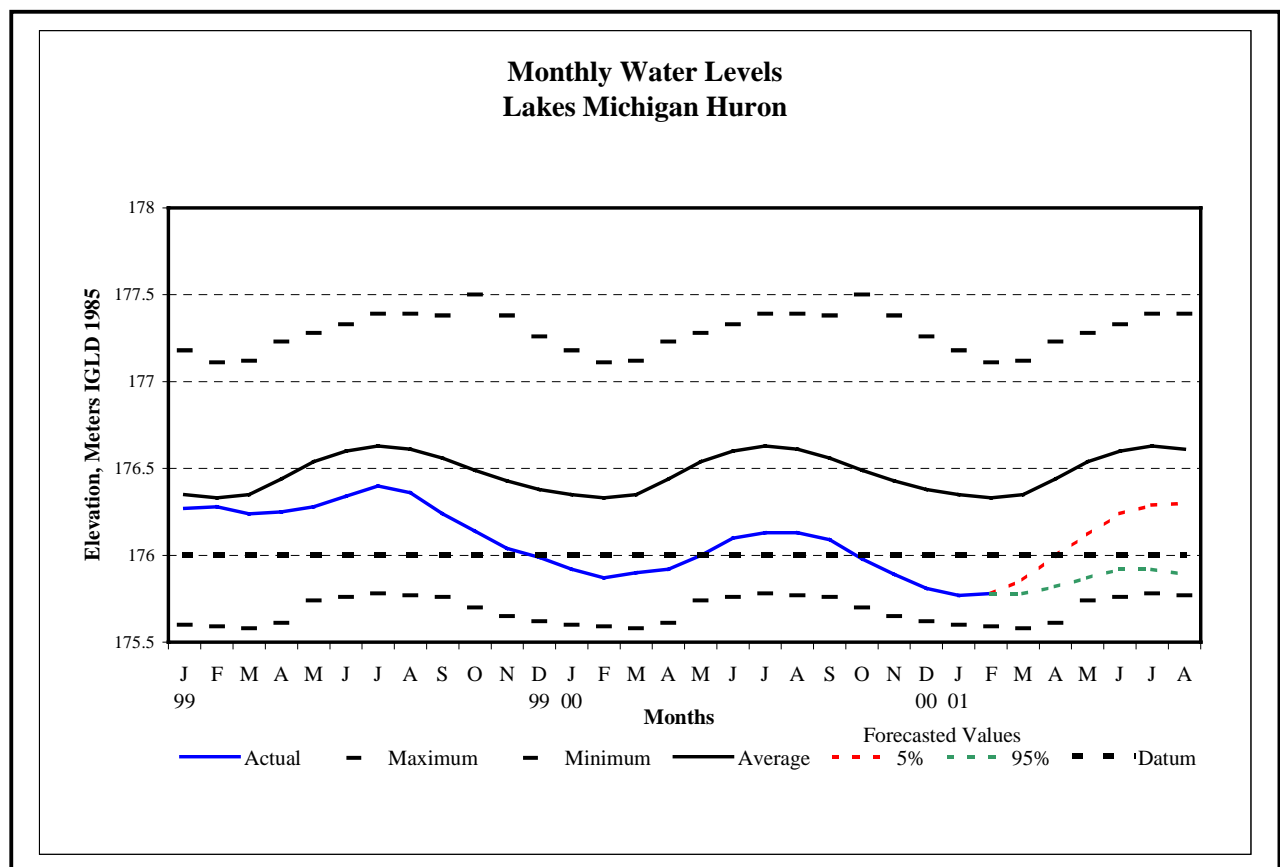
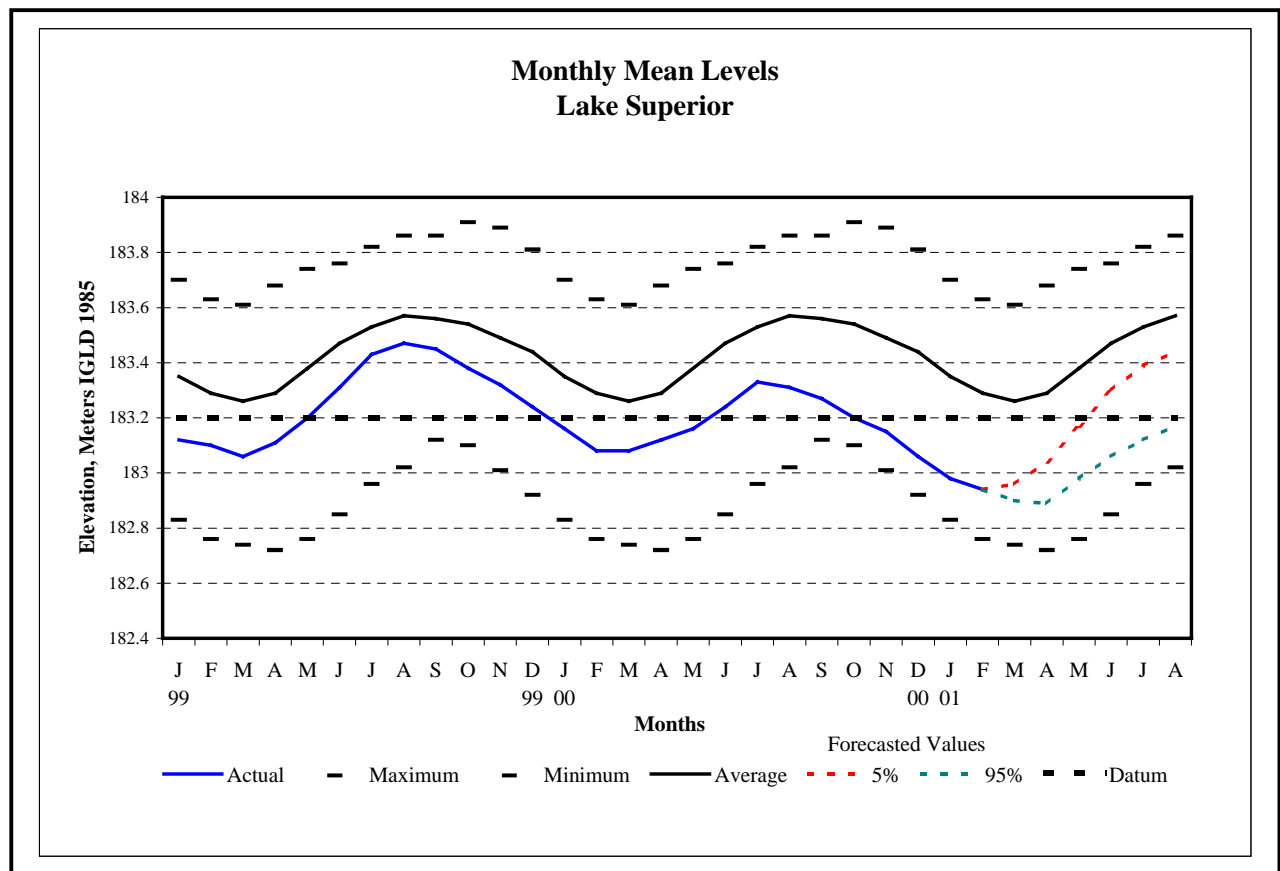
Respectfully submitted,

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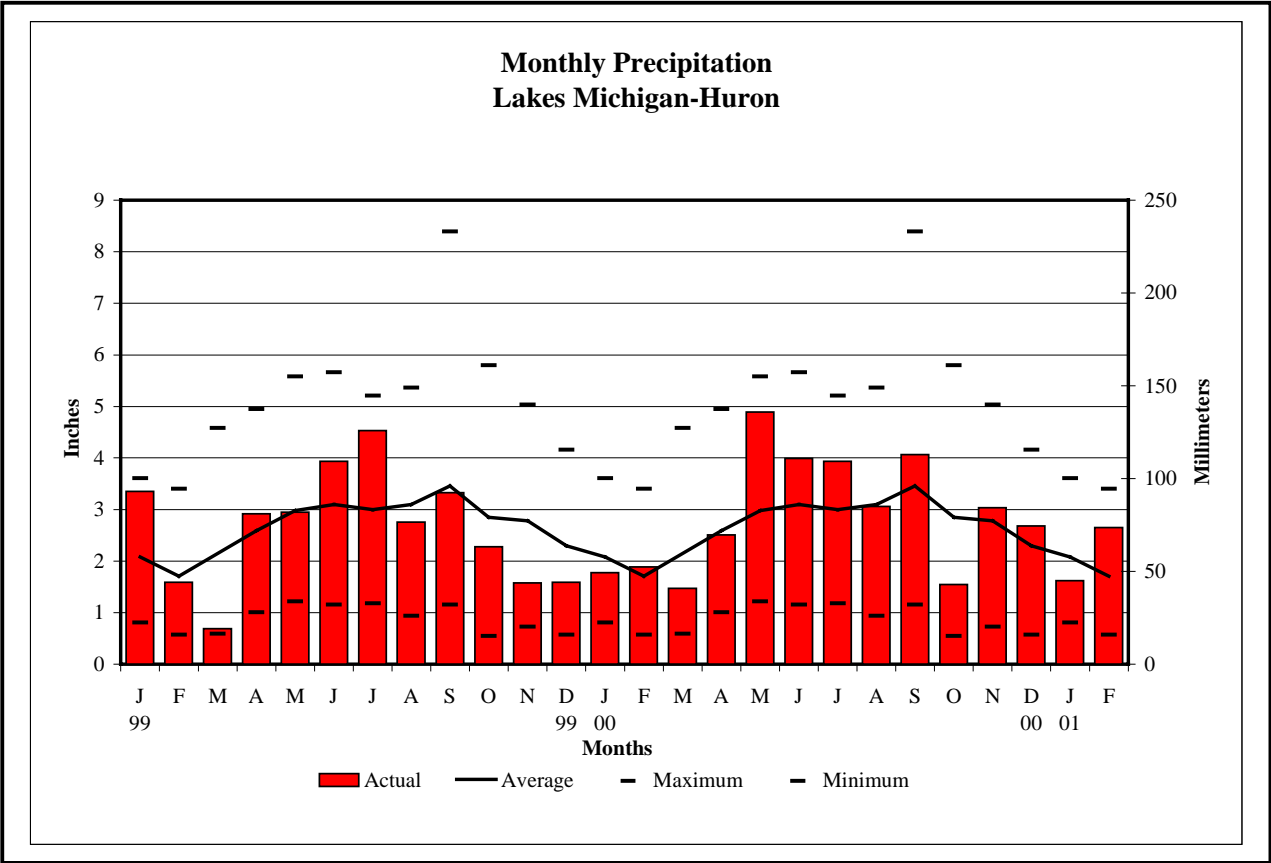
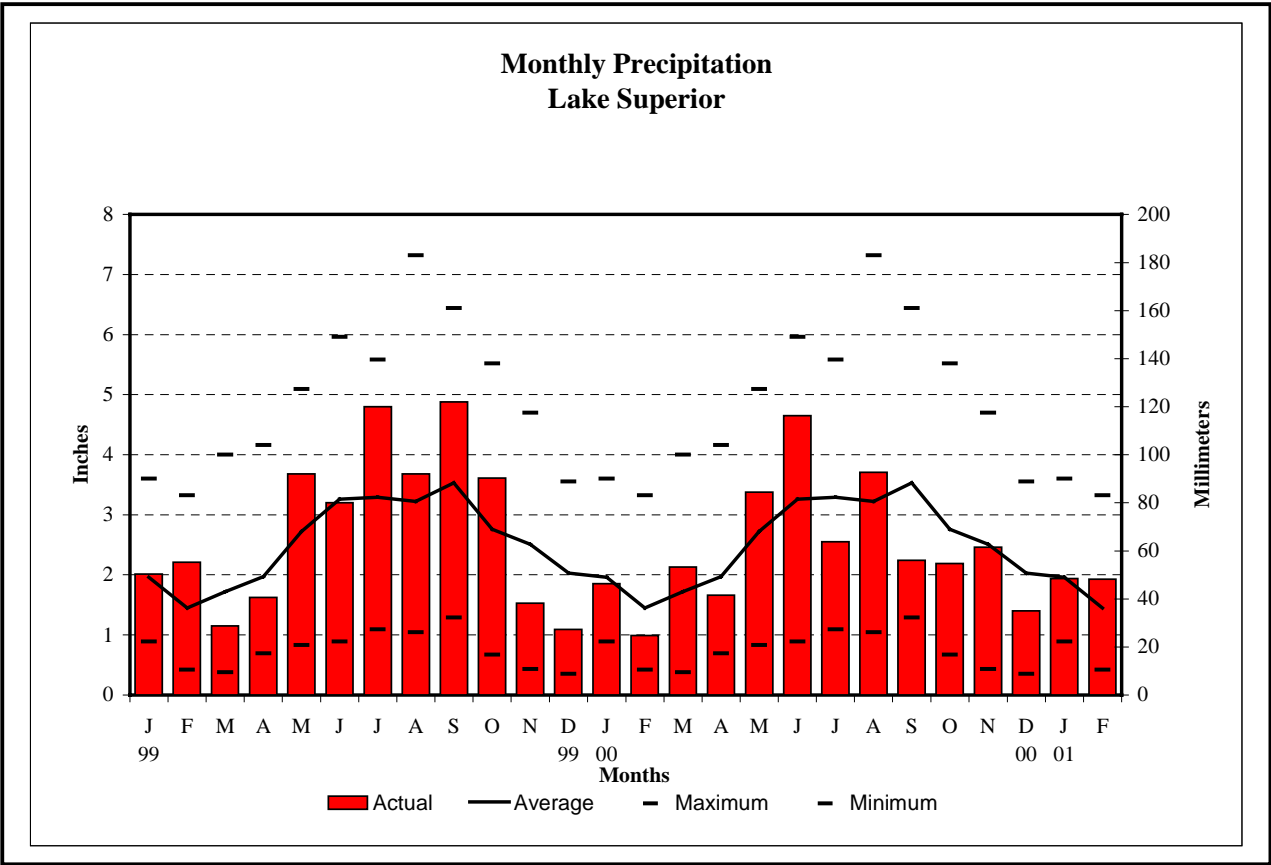
BG Robert H. Griffin  
Member for United States

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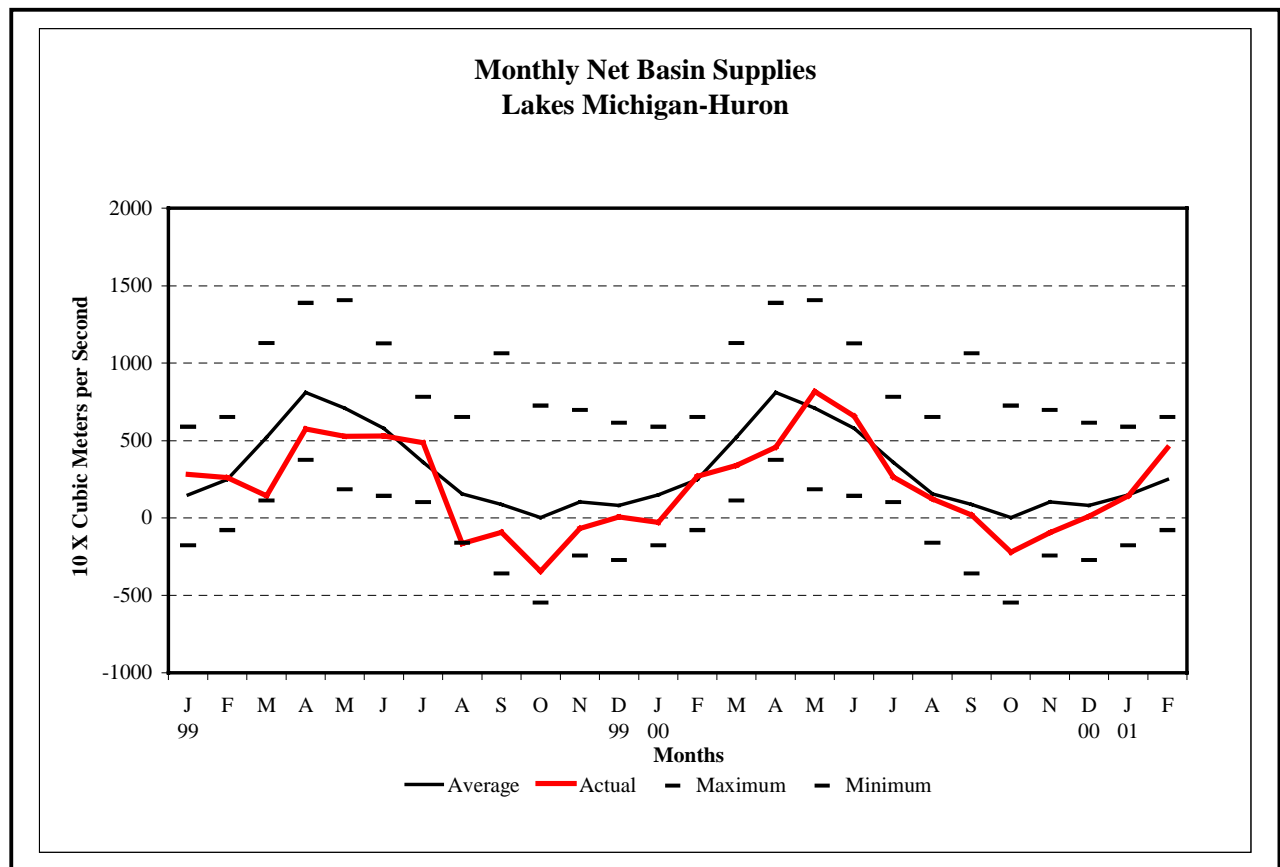
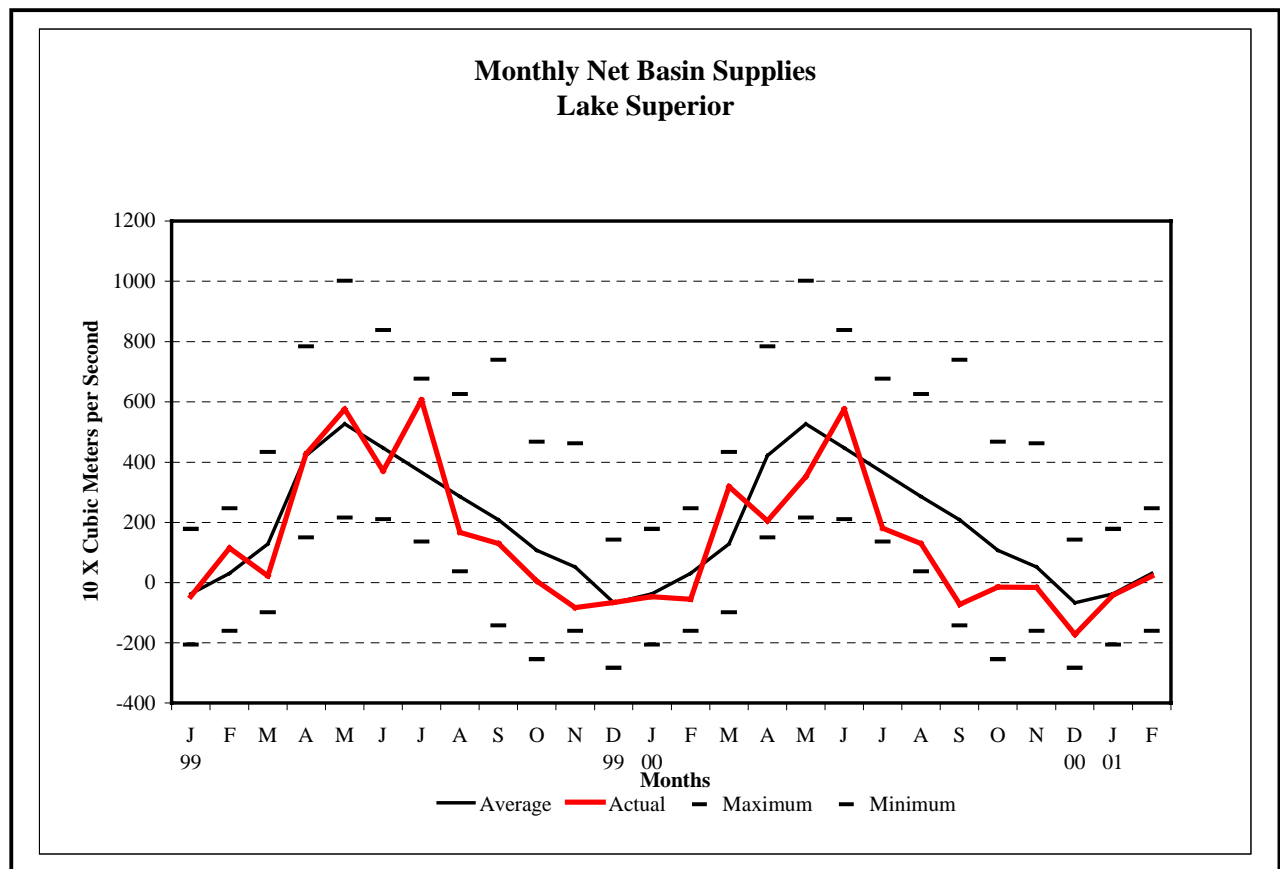
Doug Cuthbert  
Member for Canada



**Figure 1**



**Figure 2**



**Figure 3**

**TABLE 1**  
**2000 - 2001 Lake Superior Hydrologic Factors**

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded <sup>1</sup>		Difference From Average <sup>2</sup>		Monthly Mean Recorded		Exceedence Probability	Monthly Mean Recorded		Percent of Average <sup>3</sup>
	meters	feet	meters	feet	m3/s	tcfs	(%)	m3/s	tcfs	
Jan-00	183.16	600.92	-0.19	-0.62	-470	-17	54	1890	67	97
Feb-00	183.08	600.66	-0.21	-0.69	-560	-20	87	1780	63	94
Mar-00	183.08	600.66	-0.18	-0.59	3180	112	7	1720	61	91
Apr-00	183.12	600.79	-0.16	-0.52	2050	72	95	1840	65	94
May-00	183.16	600.92	-0.22	-0.72	3520	124	84	1860	66	88
Jun-00	183.24	601.18	-0.23	-0.75	5750	203	20	1720	61	78
Jul-00	183.33	601.48	-0.20	-0.66	1800	64	96	2070	73	90
Aug-00	183.31	601.41	-0.25	-0.82	1290	46	91	2170	77	91
Sep-00	183.27	601.28	-0.29	-0.95	-730	-26	98	1920	68	81
Oct-00	183.20	601.05	-0.34	-1.12	-140	-5	82	1560	55	68
Nov-00	183.15	600.89	-0.34	-1.12	-140	-5	68	1560	55	69
Dec-00	183.06	600.59	-0.37	-1.21	-1720	-61	90	1570	55	76
Jan-01	182.98	600.32	-0.37	-1.21	-390	-14	49	1600	56	82
Feb-01	182.94	600.20	-0.35	-1.15	210	7	52	1570	55	82

Notes: m<sup>3</sup>/s = cubic meters per second      tcfs = 1000 cubic feet per second

<sup>1</sup> Water Levels are a mean of five gauges on Lake Superior, IGLD 1985

<sup>2</sup> Average levels are for period 1918-2000, based on a mean of five gauges.

<sup>3</sup> Average flows are for the period 1900-1989.

**TABLE 2**  
**2000 - 2001 Lakes Michigan-Huron Hydrologic Factors**

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded <sup>1</sup>		Difference From Average <sup>2</sup>		Monthly Mean Recorded		Exceedence Probability	Monthly Mean Recorded		Percent of Average <sup>3</sup>
	meters	feet	meters	feet	m <sup>3</sup> /s	tcfs	(%)	m <sup>3</sup> /s	tcfs	
Jan-00	175.92	577.17	-0.43	-1.41	-280	-10	91	4200	148	94
Feb-00	175.87	577.00	-0.47	-1.54	2700	95	42	3940	139	90
Mar-00	175.90	577.10	-0.45	-1.48	3400	120	77	4580	162	95
Apr-00	175.92	577.17	-0.52	-1.71	4570	161	94	4530	160	88
May-00	176.00	577.43	-0.54	-1.77	8170	289	29	4580	162	85
Jun-00	176.10	577.76	-0.50	-1.64	6560	232	30	4620	163	85
Jul-00	176.13	577.85	-0.50	-1.64	2650	94	72	4630	164	84
Aug-00	176.13	577.85	-0.48	-1.57	1230	43	56	4650	164	84
Sep-00	176.09	577.72	-0.47	-1.54	180	6	61	4690	166	85
Oct-00	175.98	577.36	-0.51	-1.67	-2210	-78	90	4620	163	85
Nov-00	175.89	577.07	-0.54	-1.77	-950	-34	85	4540	160	84
Dec-00	175.81	576.80	-0.57	-1.87	100	4	62	4260	150	82
Jan-01	175.77	576.67	-0.58	-1.90	1430	50	49	3830	135	85
Feb-01	175.78	576.71	-0.56	-1.84	4520	160	8	4210	149	97

Notes: m<sup>3</sup>/s = cubic meters per second      tcfs = 1000 cubic feet per second

<sup>1</sup> Water Levels are a mean of six gauges on Lakes Michigan-Huron, IGLD 1985

<sup>2</sup> Average levels are for period 1918-2000, based on a mean of six gauges.

<sup>3</sup> Average flows are for the period 1900-1989.

**TABLE 3**  
**MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic meters /second )**

		POWER CANALS				NAVIGATION CANALS			DOMESTIC USAGE				Fishery St. Marys Rapids	Total Lake Superior Outflow m <sup>3</sup> /s
Year and Month	US Govern't Hydro.	Edison Sault Electric	US Total	Great Lakes Power	Total Power Canals	United States	Canada	Total Navigation Canals	Sault Ste. Marie US+Can.	Algoma Steel	St. Marys Paper	Ttotal Domestic Usage		
2000														
JAN	351	550	901	888	1789	3.9	0.0	4	0.3	3.6	0.3	4	96	1893
FEB	367	478	845	833	1678	1.4	0.0	1	0.3	3.7	0.3	4	94	1777
MAR	358	442	800	814	1614	3.4	0.0	3	0.3	3.8	0.3	4	94	1715
APR	369	506	875	859	1734	11.5	0.0	12	0.3	3.6	0.3	4	95	1845
MAY	371	509	880	868	1748	13.2	0.8	14	0.3	3.7	0.3	4	96	1862
JUN	370	446	816	786	1602	14.2	2.1	16	0.3	3.6	0.3	4	97	1719
JUL	371	693	1064	885	1949	16.1	2.7	19	0.4	3.7	0.3	4	98	2070
AUG	368	663	1031	968	1999	15.8	2.4	18	0.4	3.7	0.3	4	151	2172
SEP	365	540	905	901	1806	15.2	1.8	17	0.4	3.4	0.3	4	97	1924
OCT	361	330	691	754	1445	12.5	0.7	13	0.3	3.3	0.3	4	96	1558
NOV	361	364	725	726	1451	12.3	0.0	12	0.3	3.3	0.3	4	96	1563
DEC	386	350	736	728	1464	10	0.0	10	0.3	3.3	0.3	4	95	1573
2001														
JAN	368	399	767	730	1497	3.3	0.0	3	0.3	3.4	0.3	4	93	1597
FEB	336	416	752	718	1470	2.1	0.0	2	0.3	3.1	0.3	4	93	1569

**TABLE 4**

## MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic feet / second)

		POWER CANALS				NAVIGATION CANALS			DOMESTIC USAGE				Fishery St. Marys Rapids	Total Lake Superior Outflow m <sup>3</sup> /s
Year and Month	US Govern't Hydro.	Edison Sault Electric	US Total	Great Lakes Power	Total Power Canals	United States	Canada	Total Navigation Canals	Sault Ste. Marie US+Can.	Algoma Steel	St. Marys Paper	Ttotal Domestic Usage		
2000														
JAN	12400	19400	31800	31400	63200	138	0	138	11	127	11	149	3390	66900
FEB	13000	16900	29900	29400	59300	49	0	49	11	131	11	153	3320	62800
MAR	12600	15600	28200	28700	56900	120	0	120	11	134	11	156	3320	60500
APR	13000	17900	30900	30300	61200	406	0	406	11	127	11	149	3350	65100
MAY	13100	18000	31100	30700	61800	466	28	494	11	131	11	153	3390	65800
JUN	13100	15800	28900	27800	56700	501	74	575	11	127	11	149	3430	60900
JUL	13100	24500	37600	31300	68900	569	95	664	14	131	11	156	3460	73200
AUG	13000	23400	36400	34200	70600	558	85	643	14	131	11	156	5330	76700
SEP	12900	19100	32000	31800	63800	537	64	601	14	120	11	145	3430	68000
OCT	12700	11700	24400	26600	51000	441	25	466	11	117	11	139	3390	55000
NOV	12700	12900	25600	25600	51200	434	0	434	11	117	11	139	3390	55200
DEC	13600	12400	26000	25700	51700	353	0	353	11	117	11	139	3350	55500
2001														
JAN	13000	14100	27100	25800	52900	116	0	116	11	117	11	139	3280	56400
FEB	11900	14700	26600	25400	52000	74	0	74	11	109	11	131	3280	55500

NOTES 1. Flows for individual users were originally coordinated in m3/s, and are converted here to U.S. customary units (cfs) and rounded to 3 significant figures. Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.